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August 17, 2010

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION UNIT 1
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-12
LICENSE EVENT REPORT (LER 2009-002-01)
AUTOMATIC REACTOR TRIP DUE TO A MAIN GENERATOR OUTPUT BREAKER FAULT

Attached is Licensee Event Report (LER) No. 2009-002-01 for the Virgil C. Summer Nuclear Station (VCSNS) Unit 1. The revised report describes the automatic reactor trip that occurred on October 2, 2009. The initiating event was a trip of the main turbine due to a ground fault in the main generator protection circuitry. This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A). The timeliness of the submittal of this supplemental report has been entered into the station's corrective action program under condition report CR-10-02013.

This LER contains no regulatory commitments.

Should you have any questions, please call Mr. Bruce Thompson at (803) 931-5042.

Very truly yours,

Thomas D. Gatlin

WCM/TDG/cm
Attachment

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File (818.07)
PRSF (RC-10-0111)

IE22
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NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Virgil C. Summer Nuclear Station Unit 1	05000 395	1 OF 3

4. TITLE

Automatic reactor trip due to a main generator output breaker fault

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
10	02	2009	2009	- 2 -	1	08	17	2010	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

Mode 1

10. POWER LEVEL

100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☑ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Virgil C. Summer Nuclear Station Unit 1	(803) 931-5042

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	EL	BKR	B455	Yes					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ◉ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On October 2, 2009, at approximately 0649 hours, the plant was operating in Mode 1 at 100% power when the reactor automatically tripped due to a main turbine trip. The turbine trip was initiated by a main generator stator ground. All systems responded as required. The emergency feedwater pumps automatically started on low-low steam generator level as expected. The plant stabilized in Mode 3 and remained in Mode 3 until repairs were complete.

The cause of the stator ground was determined to be a failure in the 'B' phase of the main generator output breaker. The 'B' phase contact was found to be damaged. Damaged parts were sequestered for investigation and further analysis. After an extensive analysis by the root cause team and the breaker vendor, the root cause of the 'B' phase failure could not be conclusively determined. An independent assessment by external consultants was also inconclusive.

Due to obsolescence of the main generator output breaker and difficulties experienced while procuring replacement parts during the breaker repair effort, the main generator breakers are scheduled to be replaced in the next refueling outage.

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NARRATIVE

PLANT IDENTIFICATION

Westinghouse - Pressurized Water Reactor

EQUIPMENT IDENTIFICATION

XCB0001 - Main Generator Output Breaker

IDENTIFICATION OF EVENT

On October 2, 2009, at approximately 0649 hours, the plant was operating in Mode 1 at 100% power when the reactor automatically tripped due to a main turbine trip. The turbine trip was initiated by a main generator stator ground.

EVENT DATE

October 2, 2009

Condition Report CR-09-03811 was written to address event.

REPORT DATE

Initial - November 25, 2009
Revision 1 - August 17, 2010

CONDITIONS PRIOR TO EVENT

Mode 1, 100% Power

DESCRIPTION OF EVENT

On October 2, 2009, at approximately 0649 hours, with the plant operating at 100% power, the 64G relay (GENERATOR STATOR GROUND) actuated and initiated a turbine trip resulting in a reactor trip. By design, 30 seconds after the turbine trip, the main generator output breaker received an open signal. Main generator breaker position in the control room indicated a mid-position condition. Further investigation revealed the 'B' phase of the output breaker did not fully open. The 'B' phase contact was observed to be damaged. All systems responded as required. The emergency feedwater pumps automatically started on low-low steam generator level as expected. The plant stabilized in Mode 3 and remained in Mode 3 until repairs were complete.

Initial inspection of the 'B' phase of the main generator breaker indicated flash burns and an acrid smell. Removal and disassembly of the 'B' phase revealed damage to the breaker isolator (main contact) and the mating connection (finger carrier). An air hose and a cooling water line were found damaged as a result of the event. Failure of the main generator output breaker's 'B' phase has been determined to be the initiator of the event which created the ground fault condition.

CAUSE OF EVENT

After investigation and performance of electrical testing it was determined that degradation of the 'B' phase contact was the initiator of the ground fault condition. The cause of the breaker degradation was extensively investigated by the root cause team, the breaker vendor, and external consultants. Unfortunately, due to the extent of damage experienced by 'B' phase breaker components during the event, the root cause for the breaker failure could not be determined. It is postulated that a cracked finger carrier assembly allowed a loosening of the fingers at the heavy current isolator connection. This looseness resulted in increased contact surface resistance and ultimately led to a thermal runaway condition. Due to the nature of the event, no evidence existed to support determination of how the crack was initiated and therefore a root cause for the condition could not be developed.

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NARRATIVE

ANALYSIS OF EVENT

The Reactor Protection System (RPS) responded as designed. Actuation of the 64G relay (GENERATOR STATOR GROUND) in the main generator protection system sent a signal to trip the main turbine. With the plant at greater than 50% reactor power, the main turbine trip signal initiated the reactor trip. The Engineered Safeguard Feature system responded as designed and there were no safety consequences as a result of this event.

CORRECTIVE ACTIONS

The 'B' phase of the generator output breaker was rebuilt. Post maintenance testing of the 'B' phase of the generator breaker was satisfactory. Tests for potential grounds within the system were performed with satisfactory results. Monitoring during startup after repairs was performed and no issues were identified.

Due to obsolescence of the breakers and difficulty experienced in procuring replacement parts, the main generator output breakers are scheduled for replacement during the next refueling outage (RF-19). In the interim, additional field points are being monitored and trended by station personnel until the breakers are replaced. It is intended that the new breaker design will incorporate temperature monitoring instrumentation.

PRIOR OCCURRENCES

None. There were no prior failures of the main generator output breaker during the past three years.